Zoosyst. Evol. 101 (3) 2025, 1297–1307 | DOI 10.3897/zse.101.152765

Leopardus narinensis Ruiz-García, Pinedo-Castro & Shostell, 2023 (Mammalia, Carnivora, Felidae) is a junior synonym of *Leopardus pardinoides* (Gray, 1867): the need for good practices in nomenclatural and taxonomic proposals

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Academic editor: Melissa T. R. Hawkins ♦ **Received** 12 March 2025 ♦ **Accepted** 3 July 2025 ♦ **Published** 30 July 2025

Abstract

Leopardus narinensis was first mentioned in 2018, but at that time it was not available under the rules of the International Code of Zoological Nomenclature (ICZN) due to the absence of a designated type specimen and a detailed description. The name only became available in 2023, when the same authors published a formal description in accordance with ICZN requirements. In this study, based on morphological and genetic data, we compared and analyzed the type specimen of *L. narinensis* with specimens of *L. pardinoides* (Gray, 1867) from Colombia housed in scientific collections. We conclude that *Leopardus narinensis* Ruiz-García, Pinedo-Castro & Shostell, 2023, is a junior synonym of *Leopardus pardinoides* (Gray, 1867). In addition, we highlight problems associated with the use of unavailable names and recommend good practices for taxonomic and systematic studies.

Key Words

Colombia, Neotropics, new species, small felids

Introduction

The order Carnivora comprises species distributed in several regions worldwide (Hunter 2011; Burgin et al. 2019). Carnivorans have one of the lowest discovery rates compared to other mammal orders, such as Primates (2 vs. 67 de novo taxa from 2005 to 2018; Burgin et al. 2019). For instance, for the Neotropics, only one species of Carnivora has been described as new in the last decade, the olinguito, *Bassaricyon neblina* (Helgen et al. 2013). For small Neotropical felids, recent taxonomic revisions have elevated several subspecies to the species level and revalidated taxa that were considered synonyms (e.g., Nascimento and Feijó 2017; Nascimento et al. 2021), but only one de novo species has been described (Ruiz-García et al. 2023). The genus *Leopardus* currently comprises 14 species (Mammal Diversity Database 2025), with *Leopardus pardinoides* (Gray, 1867) recently elevated to species status (de Oliveira et al. 2024). Before this, *L. pardinoides* was considered either a subspecies (Cabrera

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1958; Wozencraft 2005) or a junior synonym of *Leopardus tigrinus* (Nascimento and Feijó 2017). However, genomic, morphological, and distribution analyses provided evidence to recognize *L. pardinoides* as a full species (Lescroart et al. 2023; de Oliveira et al. 2024).

Ruiz-García et al. (2023) designated a new species of small spotted Neotropical cat, named as *L. narinensis*, based on a specimen from Colombia. Nevertheless, the history of the taxonomic description of *L. narinensis* is preceded by several inconsistencies. The presence of a new species of *Leopardus* from Colombia and Ecuador was suggested in several papers (Ruiz-García et al. 2018; Pinedo-Castro and Ruiz-García 2020; Ruiz-García et al. 2022a) before its formal description (Ruiz-García et al. 2023). In some of these papers, the binomen *Leopardus narinensis* appears mentioned and followed by citations that appear as "in press" in journals such as *Scientific Reports* and *Journal of Vertebrate Biology* (see citations in Pinedo-Castro and Ruiz-García 2020, and Ruiz-García et al. 2022a; Appendix 1). However, to the best of our knowledge, these "in press" articles have never been published to date in those journals. This scientific name also appeared in Colombian newspapers (Betancur Alarcón 2017). In a paper on the phylogeography of *Leopardus wiedii*, Pinedo-Castro and Ruiz-García (2020) suggested that *L. narinensis* is supported by both morphological and molecular data, although no evidence was presented, and highlighted that specialists have not yet fully confirmed this proposal. Ruiz-García et al. (2023) formally described *L. narinensis* based on a single skin collected in the Volcán Galeras in the Department of Nariño, Colombia. The description included only limited external data, and the mitochondrial genomes used are not freely available for comparisons. Ruiz-García et al. (2023) conducted morphological comparisons with the "morphogroup I" of *Leopardus tigrinus* as defined by Nascimento and Feijó (2017). Their morphological comparisons focused on the fur color, which they considered as "unique." Nonetheless, Ruiz-García et al. (2023) did not compare their *L. narinensis* with any Andean population of *Leopardus*. More recently, de Oliveira et al. (2024) reassessed the taxonomy of *L. tigrinus* (sensu Nascimento and Feijó 2017) and recognized the populations from trans-Andean South America and Costa Rica as a separate species, called *L. pardinoides*. Additionally, de Oliveira et al. (2024) proposed that populations from eastern Venezuela, Guianas, and Amapá – previously included in *L. tigrinus* (sensu Nascimento and Feijó 2017) – should instead be considered conspecific with group II of Nascimento and Feijó (2017), corresponding to *Leopardus emiliae* (Thomas, 1914). As a result, the name *L. tigrinus* now applies specifically to this latter group.

Here, we provide evidence that the binomen *Leopardus narinensis* Ruiz-García, Pinedo-Castro & Shostell, 2023, is a junior synonym of *L. pardinoides* (Gray, 1867). We include morphological and genetic information to discuss the major problems associated with the name *L. narinensis*, which affect its availability and might create communication confusion between academic and non-academic audiences.

Methods

Nomenclatural and taxonomic problems

Due to the nature of the problem, our approach was to perform a bibliographical review of works that mentioned the binomen *Leopardus narinensis* or putative new species of *Leopardus* from Colombia. We organized this information chronologically and contrasted the evidence for morphological and molecular distinction of the binomen in the identified papers with additional information available in zoological collections and GenBank.

Phylogenetic analysis

To explore the phylogenetic position of *L. narinensis* within the genus *Leopardus*, we used a genetic dataset of 16S, COX2–ATP8, and ND4–ND5 that included the holotype (IAvH 5857) of *L. narinensis* from Volcán Galeras ("Galeras Volcano") and sequences of *L. pardinoides pardinoides* (GenBank accession numbers OR257581 and OR257582), *L. pardinoides oncilla* (KP202287), *L. colocola* (sensu lato; KP202282), *L. emiliae* (currently *L. tigrinus*; OR822034), and *L. guttulus* (NC085265). We aligned the dataset with MUSCLE in Geneious v.10.2.3 (www.geneious.com) and constructed a maximum likelihood phylogeny in IQ-TREE v.1.6.12 (Nguyen et al. 2015) with three partitions, using the partition finder algorithm in IQ-TREE (-m option TESTMERGE; Lanfear et al. 2012) and model selection for each partition with ModelFinder (Chernomor et al. 2016; Kalyaanamoorthy et al. 2017) in the same software. Each partition was allowed to have its own branch lengths (-sp option), and branch support was estimated through 1,000 ultrafast bootstrap replicates (Minh et al. 2013).

Morphological comparisons

We compared external morphological traits of both *L. pardinoides* and *L. narinensis* presented in the literature (Nascimento and Feijó 2017; Ruiz-García et al. 2023; Astorquiza et al. 2023; de Oliveira et al. 2024), including spotting patterns, fur coloration, and body and tail size. We also reviewed specimens deposited in biological collections, including the Colección de Mamíferos del Museo de Historia Natural of the Universidad de Caldas (MHN-UCa-M), the Museo de Historia Natural of the Universidad del Cauca (MHNUC), and the holotype of *L. narinensis* deposited at the Instituto Alexander von Humboldt (IAvH) in Colombia (IAvH 5857; Appendix 2). We expanded our morphological comparisons of *L. pardinoides* to include specimens from the Central and Occidental Cordilleras of Colombia (Appendix 2). We included the specimen MHN-UCa-M 1860, from which whole genome data were used to elevate *L. pardinoides* to species level (de Oliveira et al. 2024). We also took cranial and dental measurements

following Nascimento and Feijó (2017): IFB, breadth between the infraorbital foramina; ZB, zygomatic breadth; IOB, interorbital length; POB, postorbital breadth; GLS, greatest length of the skull; GBB, greatest breadth of braincase; GPB, greatest palatal breadth; P4L, greatest length of P4; P4B, greatest breadth of P4; GPL, greatest palatal length; CBL, condylobasal length; RL, rostral length; ALT, anteroposterior length of temporal fossa; TH, temporal fossa height; ALM, anteroposterior length of masseter scar on skull; CM1L, C–M1 length; p3m1l, p3–m1 length; MH, mandible height; and ML, mandible length. We compiled comparative tables of the traits evaluated for *L. pardinoides* and *L. narinensis* (Tables 1, 2). Subsequently, we provided a more general and detailed description of each taxon.

Table 1. External body measurements and morphological comparisons between *Leopardus pardinoides* and *Leopardus narinensis*. Head, body, and tail mean (max-min) and sample size for *L. pardinoides*. The specimen MHN-UCa-M-1860, housed in the Museo de Historia Natural de la Universidad de Caldas, was included in genomic analyses by Lescroart et al. (2023). Additional information about *L. pardinoides* was taken from de Oliveira et al. (2024). Measurements are shown in mm.

Trait/Taxon	*Leopardus pardinoides* (de Oliveira et al. 2024)	*Leopardus narinensis* (IAvH 5857)	*Leopardus pardinoides* (MHN-UCa-M 1860)
Head and body length (mm)	485 (422–540) 237	458	490
Tail length (mm)	290 (245–340) 237	280	280
Body pattern	Relatively short ringed tail	Slightly shorter ringed tail	Relatively short ringed tail
Coat coloring	Yellowish/reddish brown	Tawny orange/reddish deep red	Yellowish, in some parts, a little reddish
Pattern of spots	Irregular rosettes that tend to merge	Rosettes in oblique chains with blurred edges	All are irregular, with internal coloration. Most of them are merged with the coat. Blurred edges.

Table 2. Measurements taken from skulls of *L. pardinoides* from the Museo de Historia Natural de la Universidad de Caldas - MHN-UCa. Specimens at the MHN-UCa measured are from the Central and Occidental Cordilleras of Colombia (Appendix 2). Values show mean (min-max) sample size. Average measurements of skulls of Morphogroup I in Nascimento and Feijó (2017). Morphogroup I (= *L. tigrinus* sensu Nascimento & Feijó, 2017) has specimens from northern, northwestern, and western South America (Peru, Ecuador, Colombia, Venezuela, Guyana, Suriname, northern Brazil, and northwestern Argentina) and Central America (Costa Rica).

Variable	*Leopardus pardinoides* MHN-UCa-M 1860	Other specimens of *L. pardinoides*. 1 male 2 female MHN-UCa	Morphogroup I (Nascimento and Feijó 2017)
IFB	19.51	19.46 (19.00–20.06) 3	21.31 (19.27–22.89) 31
ZB	–	49.04 (46.97–51.40) 3	55.14 (48.9–61.56) 31
IOB	15.70	14.1 (13.05–14.90) 3	15.72 (14.35–17.27) 31
POB	–	27.58 (27.13–27.89) 3	28.46 (25.32–31.17) 31
GLS	86.28	79.18 (76.98–81.28) 3	86.59 (80.82–95.56) 31
GBB	36.60	36.30 (35.30–38.26) 3	38.93(36.85–40.64) 31
GPB	–	27.9(26.35–28.76) 3	30.54 (27.08–33.55) 31
P4L	9.79	8.79(7.88–9.26) 3	9.92 (8.04–10.93) 31
P4B	4.43	4.38 (4.07–4.85) 3	4.7 (3.97–5.52) 31
GPL	35.27	28.69(25.90–30.23) 3	31.54 (28.13–35.68) 31
CBL	–	67.97(64.88–70.51) 3	77.67(69.13–87.31) 31
RL	27.54	27.87 (25.67–29.03) 3	29.64 (25.87–32.9) 31
ALT	–	51.58 (50.50–52.61) 3	52.03 (46.25–56.41) 31
TH	–	33.70 (32.33–34.47) 3	34.62 (32.43–38.68) 31
ALM	23.55	21.15(18.41–23.33) 3	25.04 (21.16–32.67) 31
CM1L	24.63	23.3(23.95–24.23) 3	25.2 (23.15–27.83) 31
p3m1L	18.41	15.90. (15.90) 1	18.65 (17.06–20.61) 31
MH	21.51	19.21(19.21) 1	23.13 (20.82–27.39) 31
ML	48.26	45.57 (45.57) 1	55.36 (49.71–62.45) 31

Results

Nomenclatural and taxonomic shortcomings

We reviewed the four papers in which *L. narinensis* was tentatively treated as a valid species prior to its formal description. First, (i) Ruiz-García et al. (2003) suggested the presence of a species of the genus *Lynchailurus* for Colombia, supported by a skin deposited in the mammal collection of the Alexander von Humboldt Institute in Villa de Leyva, Colombia (IAvH 5857, holotype of *L. narinensis*), from the Galeras Volcano in the Department of Nariño, southwestern Colombia. Later, (ii) Ruiz-García et al. (2018) used two mitochondrial datasets (ATP8–2R + 16S rRNA genes and partial mitogenomes) and included the specimen IAvH 5857. The authors stated that this individual is an "exemplar with a very rare morphotype not described so far coming from the southern part of Andean Colombia (Nariño Department)" (Ruiz-García et al. 2018: 1000). (iii) Pinedo-Castro and Ruiz-García (2020: 104) mentioned the binomen *L. narinensis* for the first time and argued that morphological and molecular data support the species, but, as mentioned previously, did not present or discuss the evidence in their paper. Similarly, (iv) Ruiz-García et al. (2022a) mentioned the binomen for the second time and suggested that it would likely be added to the Neotropical cat fauna. In none of the four papers did the authors include the mandatory information required to propose new names under the International Code of Zoological Nomenclature (ICZN 1999, 2012), including a description or definition that exposes the characters differentiating the new taxon (Article 13.1), the definition of the name-bearing type (Article 45.3), and the presentation of a type locality (Article 76), among others. From the nomenclatural context, the binomen *Leopardus narinensis* becomes available only in Ruiz-García et al. (2023).

Phylogenetic analysis

The final concatenated genetic dataset consisted of a matrix of seven taxa with three partitions and 5,004 total sites (0% missing data). According to BIC, the best-fit model was TN+F+I for 16S, HKY+F for COX2–ATP8, and HKY+F for ND4–ND5. Our phylogenetic analysis recovered the specimen of *Leopardus* from the Department of Nariño (IAvH 5857), referenced by Ruiz-García et al. (2003, 2022a), nested within *L. pardinoides* and confirms previous discussion in Astorquiza et al. (2023), showing 100% identity with sequences of Colombian *L. pardinoides* for all three surveyed segments (Fig. 1).

Morphological comparisons

A close comparison of *L. narinensis* with specimens of *Leopardus pardinoides* showed broad similarities between both taxa (Table 1). The external measurements of the holotype of *L. narinensis* fall within the range of *L. pardinoides* (Table 1); however, these estimates were taken directly from the skin by Ruiz-García et al. (2023) and may therefore be biased. *L. pardinoides* has a coat color that can be reddish, yellowish brown, or even a little orange; it has irregular rosettes that tend to merge. The tail is ringed and relatively long (over 60% of the head and body length). According to our revision and the description, the external fur coloration of the holotype of *L. narinensis* is tawny orange/intense reddish; the spots present rosettes in oblique chains blurred toward the edges. Ruiz-García et al. (2023) considered this coloration unique and potentially the only diagnostic morphological character. Nevertheless, the intense reddish coat color of the holotype of *L. narinensis* is likely an artifact of poor preservation. It is probable that the skin of the holotype (IAvH 5857) was

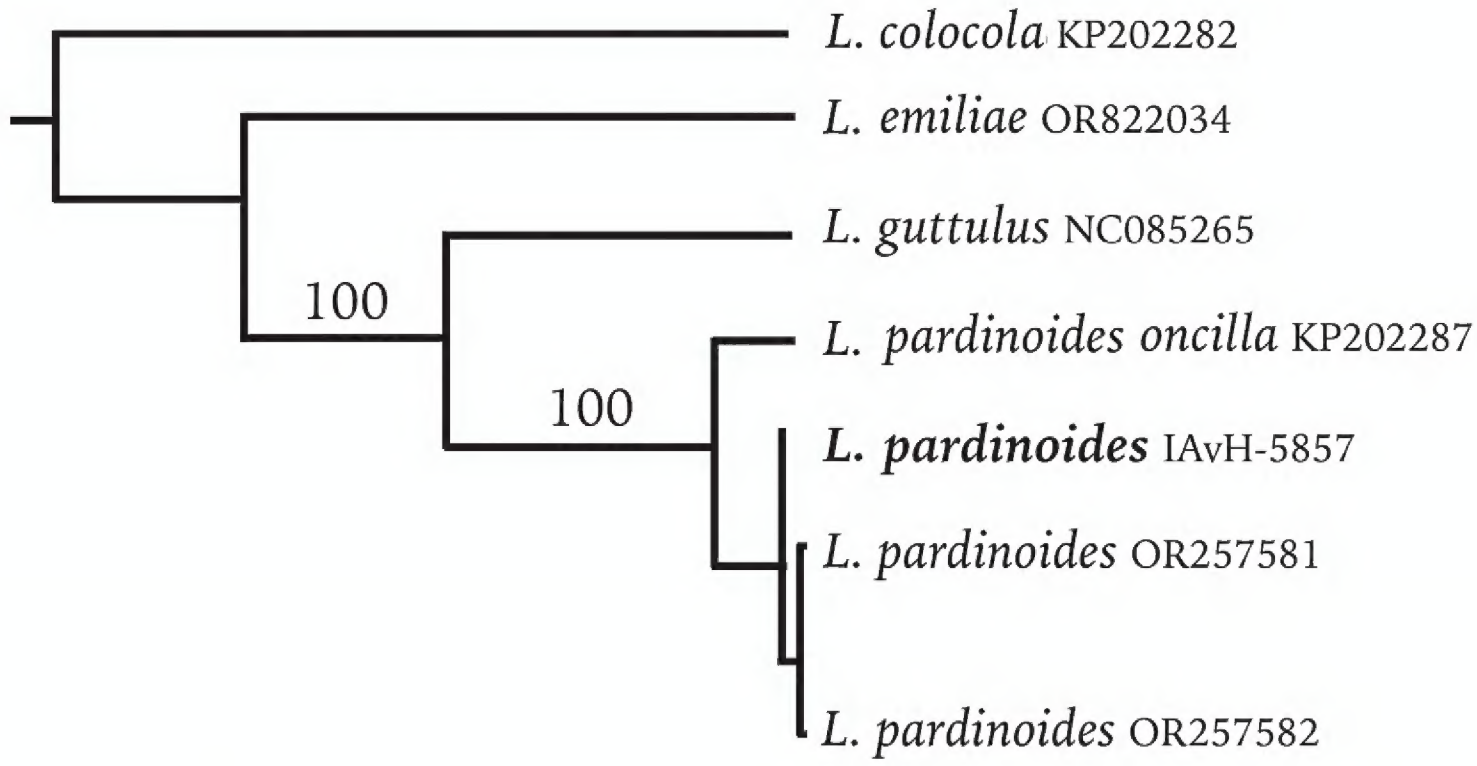

Figure 1. Maximum likelihood tree inferred from the analysis of a concatenated dataset comprising sequences of 16S, COX2-ATP8, and ND4-ND5. Numbers above branches indicate bootstrap support values (percent). The phylogenetic position of the specimen of *Leopardus* from the Department of Nariño (IAvH 5857, holotype of *Leopardus narinensis*), referenced by Ruiz-García et al. (2003; 2022a), is shown in bold. *Leopardus emilia* is currently considered a junior synonym of *Leopardus tigrinus*.

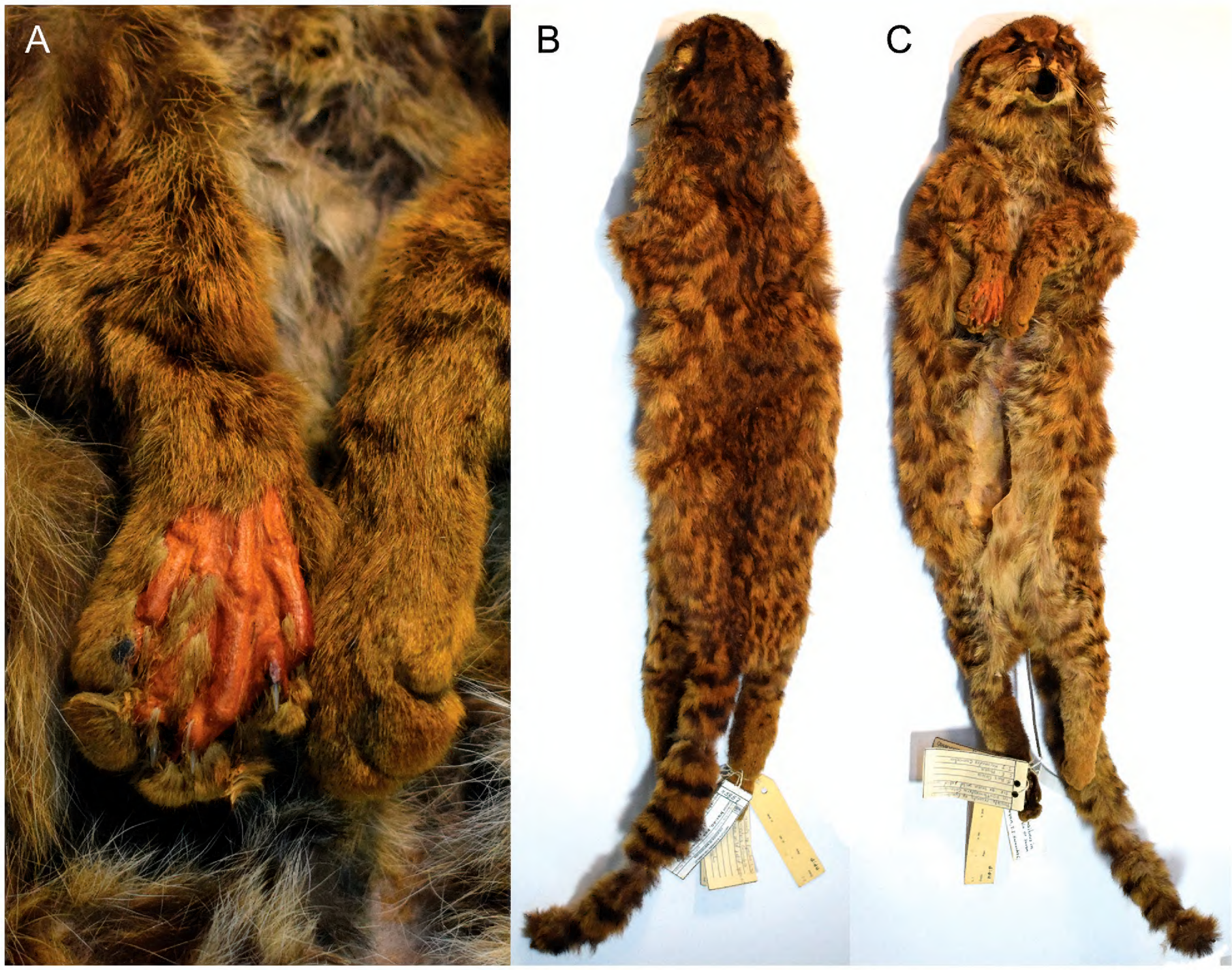

Figure 2. Holotype of *Leopardus narinensis* (IAvH 5857). Different views of *L. narinensis*. **A.** Details of the dorsal part of the hindfeet. In the right paw, a reddish coloration in the bones is observed; **B.** Ventral view of the holotype; **C.** Dorsal view of the holotype in which the coloration pattern and the rosettes are observed.

exposed to smoke or prolonged heat, considering the unusual coloration of the hindfoot bones (Fig. 2A).

The ventral area of *L. pardinoides* is lighter than the rest of the body, presenting a whitish color with some black spots or stripes. The upper back is darker, with a more intense orange or almost reddish hue. It presents very small spots on the head and two lines from the eyes to the posterior part, which surround the eyes. The ventral and facial coloration patterns are similar in *L. narinensis*, though the former is slightly lighter and also presents two lines on the head surrounding the eyes.

Morphological comparisons of the holotype of *L. narinensis* with specimens of *L. pardinoides* showed that most general traits are shared, including spotting patterns and various body measurements. Considering this, there is no reason to distinguish *L. narinensis* as an independent taxon morphologically or genetically, and we consider it a junior synonym of *L. pardinoides*.

The specimen of *L. pardinoides* (MHN-UCa-M 1860; adult female), for which whole-genome data were used to elevate *L. pardinoides* to full species status, exhibited the following cranial (Fig. 3) and external (Fig. 4) traits. The dorsal coloration is generally yellowish (citrine sensu Ridgway 1912), although some areas of the medial back have a more orangish (orange-citrine) hue. MHN-UCa-M 1860 has many rosettes, all irregular. Most rosettes have internal coloration; the others are black spots. The internal coloration of the rosettes is orange-citrine or slightly reddish, though not as intense as the mid-back fur. The edges of the rosettes are black, and some of them merge with the fur. The tail and body are short (100 mm and 180 mm, respectively). The tail is banded along its length. The skull is partially broken in MHN-UCa-M 1860 (Fig. 3), and thus some features could not be diagnosed. The skull measurements fall within the ranges of *L. pardinoides*, except for ML, which is smaller than previously reported (Table 2).

Other specimens of *L. pardinoides* from the Central Andes of Colombia housed at the MHN-UCa (Appendix 2) showed similarities in all the characteristics analyzed, not only in coat color but also in body, tail, hind leg, and ear size. Adult specimens had a yellowish (citrine or orange-citrine) coat color with some reddish coloration, especially on the back. Only the juvenile specimen MHN-

Figure 3. Details of the skull of specimens of *Leopardus pardinoides*, including MHN-UCa-M 1860, used for genomic analyses by Lescroart et al. (2023), and a juvenile specimen (MHN-UCa-M 4588). Scale bars: 100 mm.

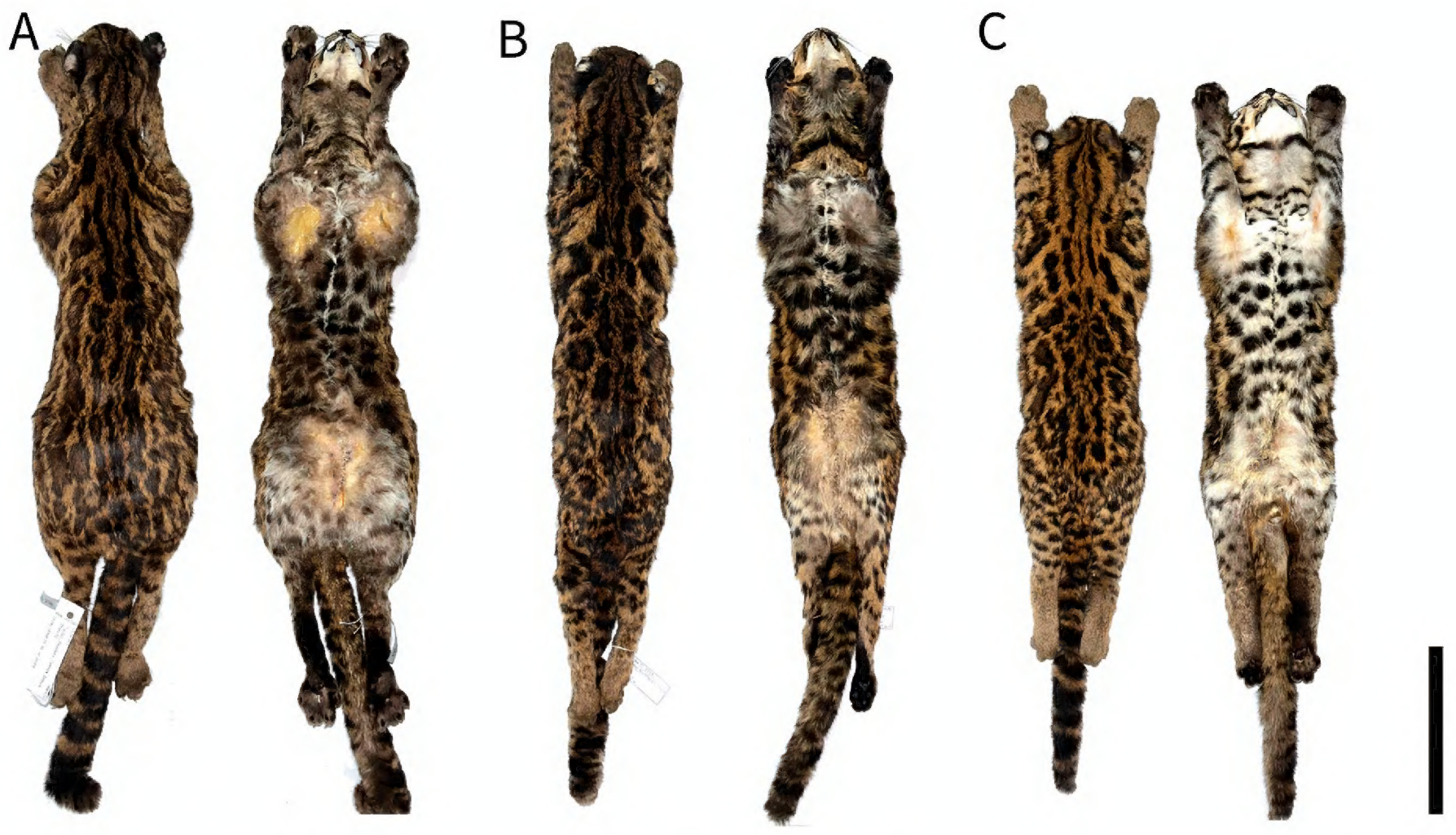

Figure 4. Comparisons of skins of *Leopardus pardinoides* of different ages from the Andean region of Colombia deposited at the Museo de Historia Natural de la Universidad de Caldas (MHN-UCa). **A.** MHN-UCa-M 1860, adult specimen used for genomic reconstructions by Lescroart et al. (2023); **B.** MHN-UCa-M 4747, subadult specimen; **C.** MHN-UCa-M 4588, juvenile specimen. Scale bar: 150 mm.

UCa-M 4588 (Fig. 4C) showed a slightly more yellowish (pyrite yellow) color than the others. All specimens have many rosettes with irregular shapes. All rosettes have black edges, while the internal coloration of most is orange-citrine, with some reddish, though not as pronounced as in the coat. The tails are short and present black rings alternating with light rings along their length. Most cranial measurements of these specimens fall within the range of *L. pardinoides*, except for CBL, ALM, p3m1L, MH, and ML, which are slightly smaller (Table 2).

Discussion

Based on genetic, morphological, and distributional data, we confirmed that the binomen *Leopardus narinensis* is a junior synonym of *Leopardus pardinoides*. Our results support the opinion of Nascimento and Feijó (2017) and Nascimento et al. (2021), who identified IAvH 5857 (currently the holotype of *L. narinensis*) as part of *L. tigrinus* sensu lato, and Astorquiza et al. (2023), who suggested that the binomen *L. narinensis* (holotype IAvH 5857) should be listed as a synonym of *L. tigrinus* (sensu lato) or *L. pardinoides* (sensu de Oliveira et al. 2024). Our phylogenetic analysis recovered the placement of this specimen within the clade of *L. pardinoides* with strong support (100%).

The description of *L. narinensis* is also marked by several shortcomings. The name should be considered a *nomen nudum* until its formal description in Ruiz-García et al. (2023). Previously, the authors had supported the presence of a new species of *Leopardus* on several occasions, citing articles "in press" that do not exist (Appendix 1). This is a practice we consider inappropriate for the following reasons: First, Ruiz-García et al. (2023) repeated conclusions from articles that had either not undergone or were rejected after peer review and are not currently available to the community. Second, because the so-called "in press" works do not exist, the authors are spreading unverified and inaccessible data. Third, researchers worldwide cannot access the full content of unpublished papers, hindering the verification, replication, and reproducibility of the findings – crucial aspects of the scientific process. Fourth, citing these works induces errors in data acquisition and interpretation, which can negatively impact public policy for endangered species, particularly in Colombia. Journals publishing taxonomic and nomenclatural works must employ editors and reviewers with expertise in the manuscript content (Wüster et al. 2024) to avoid the problems highlighted in this study.

Our reanalysis of the available evidence shows that most of the diagnostic characters proposed by Ruiz-García et al. (2023) are poorly supported. The description of *L. narinensis* raises concerns due to certain publication practices that may not fully align with standard scientific protocols. The genetic data used in Ruiz-García et al. (2023) had not been released at the time of submission of this manuscript and lack traceability, rendering the study impossible to replicate. In their paper, Ruiz-García et al. (2023) used mitogenomes of several *Leopardus* species, including the putative new species, and referenced GenBank accession numbers. However, these numbers correspond only to the 16S gene. Most scientific journals mandate that all data used in publications must be publicly accessible, including genetic data deposited in databases such as GenBank. This is an essential requirement because it ensures repeatability in scientific findings, which is not the case in Ruiz-García et al. (2023).

In addition to the limited accessibility of the sequences, the replicability of the study is further hindered by the lack of traceability between the sequences used, individual specimen identification, and locality data. As far as we know, none of the sequences used in Ruiz-García et al. (2023), except that of the type specimen of *L. narinensis*, are associated with museum specimens. A balanced approach to using both specimens and sequences is important in resolving taxonomic and biogeographical questions, as it ensures the provenance of samples, prevents misinterpretation, and supports reliable taxonomic conclusions (Wüster et al. 2024). Lack of association between vouchers and sequences is generally poor practice because it prevents corroboration across different lines of evidence. For example, the phylogenetic trees presented in Ruiz-García et al. (2023) include several clades containing distinct species and hybridization clades, but it is impossible to determine whether these reflect biological processes or misidentified sequences. Comparable concerns have emerged in other systematic studies of northern South American mammals that relied on sequences reported by Ruiz-García. For instance, sequences of deer from Colombia used in systematic studies (e.g., Hassanin et al. 2012; Heckeberg et al. 2016) are recovered as different taxa or associated with species not distributed in Colombia. Furthermore, phylogenetic and taxonomic conclusions for coatis (Ruiz-García et al. 2020), agoutis (Ruiz-García et al. 2022b), and other Neotropical mammals remain controversial and have been only partially accepted by national and international mammal checklists, such as the American Society of Mammalogists (Mammal Diversity Database 2025). Nevertheless, the binomen *L. narinensis* has been included in the ASM list (Mammal Diversity Database 2025).

The morphological comparisons show that, despite the traits identified as unique in *L. narinensis* by Ruiz-García et al. (2023), *L. narinensis* and *L. pardinoides* share highly similar pelage, as also noted by Astorquiza et al. (2023). The description of *L. narinensis* is based on a single skin, with no precise measurements and uncertainty regarding the specific collection locality. Intensive sampling in the area and surveys of biological collections have revealed no additional specimens with the same "unique" coloration from the type locality or nearby departments such as Cauca and Putumayo (Ramírez-Chaves et al. 2013) or from other countries (Nascimento and Feijó 2017). Two old skins with no specific locality (Appendix 2), but likely from the Department of Cauca (Rivas-Pava et al. 2007),

housed at the MHNUC, also exhibit a more reddish (medal bronze color sensu Ridgway 1912) pelage. However, this coloration may be an artifact of preservation. Both *L. narinensis* and *L. pardinoides* are similar in size, with similar rosette shapes and head markings. The intense reddish coat color described for the holotype of *L. narinensis* may result from preservation methods or chemical exposure. Given the unusual coloration of the hindfoot bones, it appears that the skin of the holotype (IAvH 5857) was exposed to smoke or prolonged heat, as observed in other mammals from the Andes of Nariño (Appendix 3). Poor preservation may significantly alter the natural coloration of the skin. Exposure to smoke, heat, and light during taxidermy can cause general color changes (Botella et al. 2000), shrinkage, and bone fractures (Correia 1997). Finally, the type locality is highly uncertain. The holotype of *L. narinensis* (IAvH 5857) was found near the Galeras Volcano, specifically in the páramo area (approximately 3,100 m above sea level). However, the locality is difficult to confirm, as the specimen was donated by local residents. The surrounding areas of the Galeras Volcano, including the páramo and Andean forest zones, are typical habitats of *L. pardinoides* (Ramírez-Chaves and Noguera-Urbano 2011; González-Maya et al. 2022). The specimen IAvH 5857 was previously listed as *L. tigrinus* in studies evaluating the distribution of the oncilla in Colombia (Payán Garrido and González-Maya 2011).

According to Ruiz-García et al. (2023), *L. narinensis* is at high risk of extinction, but no formal assessments have been conducted. Moreover, the lack of a thorough nomenclatural review limits the conclusions of Ruiz-García et al. (2023). There are four to six potentially applicable available names (see section *Systematics*) for *L. narinensis*, but none were adequately compared. It is inappropriate to describe a new species based solely on one skin with an incomplete dataset, lacking information on morphological variation and showing only subtle differences from other specimens, with imprecise locality data and overlooking relevant available names (Dubois et al. 2024). We recommend adhering to good practices in the proposal of new names, as applied in other vertebrate groups (Kaiser et al. 2013; Dubois et al. 2024), and even for Colombian mammals (Ramírez-Chaves and Solari 2014; Patton 2015).

Here we provide the list of synonyms of *L. pardinoides*, organized according to the two subspecies recognized by de Oliveira et al. (2024), and previous taxonomic works (e.g., Allen 1915; Thomas 1912):

Systematics

Mammalia
Felidae
***Leopardus* Gray, 1842**

Leopardus pardinoides pardinoides (Gray, 1867)

Felis pardinoides Gray, 1867: 400. Type locality: "India", amended to "Bogota", Colombia, by Gray (1874: 475).

Felis pardinoides andina Thomas, 1903: 238. Type locality "Jima, Province of Azuay, Ecuador".

Felis pardinoides emerita Thomas, 1912: 44. Type locality "Montes de la Culata," Merida (alt. 3000 m.) [Venezuela].

Margay caucensis Allen, 1915: 631. Type locality "Las Pavas, Colombia".

Margay tigrina elenae Allen, 1915: 631. Type locality "Santa Elena, Colombia".

Leopardus narinensis Pinedo-Castro and Ruiz-García, 2020: 104. *Nomen nudum*.

Leopardus narinensis Ruiz-García, Pinedo-Castro & Shostell, 2022a: 756. *Nomen nudum*.

Leopardus narinensis Ruiz-García, Pinedo-Castro & Shostell, 2023: 15. Type locality: "Galeras Volcano, Nariño Department (Colombia) (1°13'43.8"N, −77°21'33"W), 3100 m above sea level (masl)."

Leopardus pardinoides oncilla (Thomas, 1903)

Felis pardinoides oncilla Thomas, 1903. Type locality: "Volcán de Irazu, Costa Rica."

Conclusion

The recently described spotted cat, *L. narinensis*, is a junior synonym of *L. pardinoides*. We recommend the use of integrative analyses when describing new medium and large mammals, including broad representation of specimens, comparisons with available names, and strong evidence supporting their differentiation and conservation status. Small Neotropical felids are still in need of integrative research, and new efforts should focus on clarifying species complexes and distributional hypotheses for several little-studied species, particularly in northern South America.

Acknowledgments

We thank the Alexander von Humboldt Biological Resources Research Institute for granting access to collections. We also thank CORPOCALDAS and the Centro de Museos, Museo de Historia Natural, for access to specimens from the Department of Caldas. Alejandra Castaño assisted with photographs of IAvH 5857. HERC thanks the Fulbright Investigador Visitante Cohort 2023 for support. DMM thanks the Ministerio de Ciencia, Tecnología e Innovación and the Fulbright-Colombia Commission for supporting doctoral studies through the Fulbright–MinCiencias 2022 scholarship and for grant support from the U.S. National Science Foundation (DEB 1754393) and the Coypu Foundation Trust. We thank Melissa T. Hawkings and two anonymous reviewers for their comments on early versions of this manuscript.

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Appendix 1

References cited in previous works about tentative new species of spotted cats from Colombia but not published to date:

"**Ruiz-García, M, Pinedo-Castro M, Shostell JM (2019)** *Leopardus narinensis*: Morphological and Genetic (Nuclear and Mitogenomics) support for a new spotted cat from the southern Colombian Andes. Scientific Reports 9 (in press)." **[not published, cited in Pinedo-Castro and Ruiz-García 2020]**

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Figure A1.

"**Ruiz-García M, Pinedo-Castro M, Shostell JM (2021)** Morphological and genetic (nuclear and mitogenomics) support for a new undescribed spotted cat species from the southern Colombian Andes. Journal of Vertebrate Biology (in press)." **[not published, cited in Ruiz-García et al. 2022a]**

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Figure A2.

Appendix 2

Specimens of the genus *Leopardus* examined

***Leopardus pardinoides* (Gray 1867) – 11 specimens. Colombia:** 1. Caldas: Cenicafé, Reserva Planalto, Manizales, 4°59'24.32"N, 75°35'22.87"W, 2150 m (MHN-UCa-M 1860; skin and skull). 2. Caldas: Sector San Marcel, Manizales, 05°02'21"N, 75°28'28"W, 2026 m (MHN-UCa-M 4129; skin). 3. Caldas: Torre IV, Puente Verdún, Manizales, 05°04'10.17"N, 75°27'20.17"W, 2790 m (MHN-UCa-M 4747; skin); 4. Nariño: Volcán Galeras, 01°13.43'8"N, 77°21'33"W, 3100 m aprox. (IAvH 5857; holotype of *Leopardus narinensis*; skin); 5. Risaralda: Corregimiento San Clemente, Guática, 5°18'45.7"N, 75°47'21.4"W, 2099 m (MHN-UCa-M 3278; skin and skull). 6. Risaralda: Belén de Umbría, 05°12'45.58"N, 75°48'46.65"W, 1495 m (MHN-UCa-M 4588; skin and skull). 7. Tolima: road Manizales-Bogotá, Alto de Letras, 05°01'43"N, 75°20'04"W, 3500 m (MHN-UCa-M 3994; skin and skull). 8. Cauca: Munchique, Alt: 2050 m (MHNUC-M 069E, skin). 9. Cauca: Pueblillo, 1760 m (MHNUC-M 070E, skin). 10–11. Colombia: unknown locality (MHNUC-M 0103, M00104, skins).

Appendix 3

Figure A3. Photographs of mammal remains exposed to smoke by locals in the Andes of the Department of Nariño, Colombia. Note the reddish coloration of the bones.